NOVEMBER/DECEMBER 2025

FAIM42A/CAIM42A — OPERATIONS RESEARCH

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

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1. List any TWO characteristics of OR.
2. Define OR.
3. Expand the term LPP.
4. Write the two fundamental conditions in simplex method.
5. Define Vogel's Approximation Method.
6. List any TWO solution methods of Assignment Problem.
7. Define an Event.
8. Write the acronym for PERT.
9. Define payoff matrix.
10. What is known as Mixed strategy?

SECTION B — ($5 \times 5 = 25$ marks)

Answer ALL questions.

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11. (a) Explain the scope of OR.

Or

(b) Discuss any two Tools Techniques and Methods of OR.

12. (a) Show that the following system of linear equations has a degenerate solution:

$2x_1 + x_2 - x_3 = 2$

$3x_1 + 2x_2 + x_3 = 3$

Or

(b) Use Two-phase simplex method to

Maximize : $z = 5x_1 + 3x_2$

Subject to the constraints:

$2x_1 + x_2 \leq 1,$

$x_1 + 4x_2 \geq 6$ and $x_1, x_2 \geq 0$.

20. Solve the game whose payoff matrix given below

	B_1	B_2	B_4	B_4
A_1	4	–2	3	–1
A_2	–1	2	0	1
A_3	–2	1	–2	0

13. (a) Explain the steps for find a solution to a transportation problem.

Or

(b) Solve the following assignment problem:

	1	2	3	4
A	10	12	19	11
B	5	10	7	8
C	12	14	13	11
D	8	15	11	9

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14. (a) Draw a network diagram for the following data:

Activity :	A	B	C	D	E	F	G	H	I	J
Preceding activities:	None	A	A	B	A	B,E	C	D,F	G	H,I

Or

(b) Discuss the Applications of PERT.

15. (a) Solve the following 2-person zero-sum game

	Player B		
	15	2	3
Player A	6	5	7
	–7	4	0

Or

(b) Solve the following problem graphically:

	Player B		
Player A	3	–3	4
	–1	1	–3

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Discuss the Characteristics and Phases of OR.

17. Use Big M method to

Maximize $z = 6x_1 + 4x_2$

Subject to the constraints

$2x_1 + 3x_2 \leq 30, 3x_1 + 2x_2 \leq 24$

$x_1 + x_2 \geq 3, x_1 \geq 0$ and $x_2 \geq 0$.

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18. Use Vogel's Approximation Method to obtain an initial basic feasible solution of the transportation problem:

	D	E	F	G	Available
A	11	13	17	14	250
B	16	18	14	10	300
C	21	24	13	10	400
Demand	200	225	275	250	

19. The following are the details of estimated times of activities of a certain project.

Activity	Immediate predecessors	Normal time (days)
A	–	16
B	–	20
C	A	8
D	A	10
E	B,C	6
F	D,E	12

Find the critical path and the expected time of the project.